Interactive e-Therapies for patients with schizophrenia or aphasia

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Plan



- 1. Avatar Therapy
 - For patients with schizophrenia (single voice)

2. Listen In

 For stroke patients with aphasia and auditory comprehension difficulties

What is Avatar therapy?

Avatar is created by the patient

Voice and face morphing software to match their persecutor

Psychotherapy

 Therapist takes on the role of both persecutor and therapist (not a dialogue but a trialogue)

Relationship change between patient & persecutor

- Series of ~6 sessions the persecutor comes under the control of the patient
- Recordings of the sessions are provided to the patient to play on an mp3 player

Study design



Outcome measures

Three main ones: all patient reported PROMs

- The Psychotic Symptom Rating Scale PSYRATS
 - Hallucinations section, which captures information on the frequency and disturbing qualities of the hallucinations [0-55]

Beliefs About Voices Questionnaire BAVQ-R

- Omnipotence: power of the voice as perceived by the patient
- Malevolence: measures the patient's beliefs about the evil intentions of the voices towards them [0-36]

Calgary Depression Scale CDS [0-27]

Patients

Table 1 Sociodemographic data of patients (n = 26)n Gender Male 16 26 randomised Female 10 but 9 dropped Employment None 14 out = 34% Retired 3 Student (expected rate 6 Part time 1 25%) Full time 2 Education No qualifications 7 GCSE 10 A level 3 Degree Voice duration, years^a 1-5 8 3 6-10 >10 15 Medication compliance. None 2 2 Partial 22 Complete a. Range 3-30.

Results: Hallucinations



* Across both groups: p = 0.003; -8.75 points

Results: Beliefs about voices



Results: Depression



Phase III replication (King's)



Why does Avatar therapy work?

Psychotherapy

- Somewhere in between "shallow" and "deep"
- Possible explanations for the effectiveness
 - Face validity of the patient's experience
 - The effect of establishing a dialogue with the avatar
 - Patients' relationship with the avatar
 - The experience of gaining control over the avatar
 - Reducing low self-esteem by challenging the Avatar





Dr Sonia Brownsett





Victoria Fleming

Speech comprehension therapy program for people with post-stroke aphasia

LISTEN-IN

Auditory perception of speech affected











connect the communication disability network



NHS National Institute for Health Research

e-Therapies: why gamify?

- 1) Reward engagement:
- Patients need to complete ~100 hours of therapy
- 2) Have a break from therapy:
- alternate therapy game therapy game



Therapy Task:

Word/phrase/sentence → picture matching

1. Patient hears a word, phrase or sentence

2. They choose the matching picture, and get visual feedback (ticks/crosses)

3. They get 'rewarded' with coins for every answer

- 2 coins if correct on first response
- 1 coin any other response
- > They can listen again if they want

> Target items include nouns, verbs, prepositions, adjectives, pronouns and tense





Challenge example...

One lexical item = 'ball'

Six different challenge items =

BallSingle nounthe ballNoun phrasea bright ballAdjective phrasethe ball bouncesIntransitive sentencethe girl plays with a ballIntransitive + prepositional sentencethe boy kicks a ball after schoolTransitive + prepositional sentence







Difficulty is based on:

- 1. Linguistic complexity: word, phrase and sentence
 - The target is always a single word, in the context of a phrase or sentence.
 - Easy Medium Hard
- 2. Psycholinguistic variables:
 - Frequency in spoken English
 - Concreteness
 - Syllable length
- 3. Number of foils presented (2-5)



- 4. Background noise
 - Band pass filtering
 - Background environmental noise and different levels (signal to noise ratios) (e.g. café ambiance)



Gaming/interface development









January 2015

Early 2016



World Map



Game walkthrough





Therapy



Game



Win jigsaw pieces





Next level



Finish level



Finish jigsaw

UCL



Backend



Exposur Correct

Exposur Correct

0 0

Stimuli Forced/Train	ed items	Therapy blocks	Therapy ti	ime																		
Select patient:	green :	= correct, red = in	correct, m	= mean, s	d = standa	ard deviation									Lexio	al items: covera	ge = 878 item	ns (99.1%), accurac	y = 0.719			
1	Block	Linguistic categ	o Noise	Btype	Acc %	Items	Freq	Conc	Distr	Complexity	Diversit Us	er ability	Training step		Idx	Name	Exposure	Correct				
101	0	word/phrase	0	0	46.67	The wine	7	7	2	0.1322	0 0.1	322	0		0	ball	8	4	<u>*</u>			
201						roll	7	7	2	0.1322	0				1	bed	14	10				
						The screen	7	7	2	0.1322	0				2	fish	8	4				
						fish	8	7	2	0.1	0				3	house	3	0				
						a roof	7	7	2	0.1322	0				4	fly	14	8				
						gold	8	7	2	0.1	0				5	men	14	12				
						The egg	7	7	2	0.1322	0				6	book	15	7				
						the skin	7	7	2	0.1322	0				7	face	8	3				
						roof farm	7	7	2	0.1322	0				8	wall	15	9				
						The crowd	7	7	2	0.1322	0				9	lock	16	7				
	1	word/phrase	0	0	73.33	The meal	7	7	2	0.1322	0 0.1	322	0.004		-				<u> </u>			
						sheep the flower	7	7	2	0.1322	0				Chal	lenge items: cov	erage = 2160	items (64.13%), ad	ccuracy = 0.719			
						The cloud	7	7	2	0.1322	0				Idx	Name			Lexical item	Freq	Conc	
						her vehicle The plant	7	7	2	0.1322	0				0	ball			ball	8	7	
						The kid	7	7	2	0.1322	0				1	bed			bed	8	7	
						The sugar The movie	7	7	2	0.1322 0.1322	0				2	fish			fish	8	7	
						The dinner	7	7	2	0.1322	0				3	house			house	8	7	
						spot The net	8 7	6 7	2	0.1375	0				4	fly			fly	7	7	
						clock	7	7	2	0.1322	0				5	men			men	8	7	
						forest	7	7	2	0.1373	0				6	book			book	8	7	
	2	word/phrase	0	0	66.67	The food	8	7	2	0.1	0 0.1	362	0		7	face			face	8	7	
		Contraction Procession				The building	8	7	2	0.1	0				8	wall			wall	8	7	
4	2					The clean floor woman	8	6	2	0.1	0				9	lock			lock	6	7	
Patie	ent	S				The page teacher music	7 7 8	7 7 6	2 2 2	0.1322 0.1322 0.1375	0 0 1				Chal	lenge item featu	ires: coverage	= 3145 items (24.	.72%), accuracy	= 0.719		
						the old silver	8	7	2	0.1	0				Idx	Name			Lexical item	Freq	Conc	Distr
						The hole (in a sock)	7	7	2	0.1322	0				0	ball (2)			ball	8	7	2
						The camera	7	7	2	0.1322	0				1	ball (3)			ball	8	7	3
						people	8	7	2	0.1	0				2	ball (4)			ball	8	7	4
						the seat	7	7	2	0.1322	0				3	ball (5)			ball	8	7	5
	2	word/phrase	0	0	73 33	The stone	7	7	2	0.1322	0 01	362	0.004		4	bed (2)			bed	8	7	2
	5	word/prirase	U	U	200	The dinner	7	7	2	0.1322	0	502	0.004		5	bed (3)			bed	8	7	3
						The kid	7	7	2	0.1322	0				6	bed (4)			bed	8	7	4
						The bar	7	7	2	0.1322	0				7	bed (5)			bed	8	7	5
						The net The meal	7	7	2	0.1322	0				8	fish (2)			fish	8	7	2
						a) 1 61	-	-	2	7477	-			P.	9	fish (3)			fish	8	7	3





Backend



green = correct, red = incorrect, m = mean, sd = standard deviation

Block	Linguistic catego	Noise	Btype	Acc %	Items	Freq	Conc	Distr	Complexity	Diversit	User ability
531	easy sentence	0	0	60	the man dreams	6	2	5	0.6893	1	0.6919
					the man drifts	5	3	5	0.6839	0	
					over the bed	5	1	4	0.6839	0	
					between the bowls	5	1	4	0.6839	0	
					The woman explains	7	1	5	0.6946	1	
					inside the bowl	5	3	5	0.6839	0	
					in the blanket	5	1	4	0.6839	0	
					The boy peeks	3	3	4	0.6732	0	
					The man forages	4	4	5	0.6786	0	
					the girl recycles	5	3	5	0.6839	0	
					The person brakes	4	4	5	0.6786	0	
					between the dogs	5 1 4 0.6839 0					
					in the box 5 1 4 0.68	0.6839	0				
					The guy sands	3	5	5	0.6732	0	
					in the feeder	5	1	4	0.6839	0	
532	hard sentence	0	1	93.33	the girl holds a cat	7	7	2	0.3572	0	0
					she likes the job	8	4	2	0.4375	0	
					she picks the root	6	6	2	0.4268	0	
					she uses the yarn	4	7	2	0.4536	0	
					he holds the foot in his hand	7	7	2	0.3572	0	
					the man holds the grape in his hand	5	7	2	0.4214	0	
					she chooses the place for her daughter	8	4	2	0.4375	0	
					the boy trips by himself	4	4	2	0.5661	0	
					the woman cooks in the garden	8	6	2	0.3625	0	
					the man lifts outside	7	5	2	0.4322	0	
					the person hikes in the outdoors	4	6	2	0.4911	0	
					The boy crawls on the stairs	5	6	2	0.4589	0	
					the animal claws the wood	6	6	2	0.4268	0	
				the woman cheers the man	6	3	2	0.5393	0		
					she tears the paper	6	7	2	0.3893	0	

Backend



Correct	Exposure	Name	Idx
30	75	above	661
3	6	actor	368
12	15	aerial	613
5	12	air	40
4	6	airport	370
12	12	alcohol	542
11	12	allow	813
3	7	animal	587
2	5	ankle	357
10	14	answer	726

Lexical items: coverage = 878 items (99.1%), accuracy = 0.719 Lexical items: coverage = 878 items (99.1%), accuracy = 0.719

Idx	Name	Exposure	Correct	
659	by	83	32	
655	in	82	39	
660	below	81	51	
658	between	80	24	
664	beside	78	26	
666	beneath	78	47	
661	above	75	30	
656	on	55	21	
662	over	54	36	
657	under	54	38	



Where we are now:

- 36 participants recruited and in study
- 11 participants have completed therapy
- 8 participants currently taking part in therapy
- 1 patient withdrew









Summary of Listen-In therapy completed

N = 11	Total game time (hours)	Total therapy (hours)	Total therapy blocks (x15 trials)
Mean	25	90	1684
Range	(8-82)	(34-123)	(702-2897)



Patients' feedback so far...



"...at the beginning easy, gradually more difficult, but not hard enough" "Why Leprechaun?"

"I am 100% single, no one helped me, it was fine, no problem!" "I love it (the game)! It helped me relax after the therapy. I liked travel around, USA, Australia, then work, then Italy. It's fantastic, then London!" "Would you recommend the app?" "Yes, but iOS!" "100 hours too hard? No, easy!" "The game is interesting, it's good to have it" "Did you enjoy the game?" "No!!!!!! Too often and too easy!" "I have to say it's brilliant!" "Your favourite part of the therapy?" "Noise levels! Before I started it was terrible, but now completely different"

"It's boring, sooo boring......I'm going to stop, no more"













Suite of therapy apps

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Search UCL GO	UCL Home » Aphasia Lab » Therapy Apps						
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 Read-Right Eye-Search iReadMore Arabic Read-Right 	Read-Right Read-Right provides a free downloadable therapy which can help to improve reading speeds in patients with Hemianopic Alexia (a specific reading disorder related to visual impairment usually caused by a stroke or head injury). Find out more >>						
	Eye-Search Eye-Search is a free online therapy for patients with visual search problems caused by brain injury. It is a clinically proven, behavioural therapy designed to improve patients' speed and accuracy when finding objects. Find out more >>						
	iReadMore Word-reading therapy for stroke survivors with acquired reading problems. Find out more >>						
	Arabic Read-Right A therapy app for Arabic readers with Hemianopic Alexia. Find out more >>						

Summary: strengths & weaknesses

	Avatar Therapy	Listen In
Patient co- creation	Yes	Yes
Large effect size	Yes	Awaited
Acceptability	Not always	Yes
Individualized therapy	Yes	Yes
Use alone/with carer	No	Yes
Roll-out	Planning	end-2017

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